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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,041	03/31/2004	Marcus Mueller	20 03 0580-2	6268

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EXAMINER

PATEL, ISHWARBHAI B

ART UNIT	PAPER NUMBER
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2841

DATE MAILED: 03/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/814,041	Applicant(s) MUELLER, MARCUS	
	Examiner Ishwar (I. B.) Patel	Art Unit 2841	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 10-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 17 and 18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/31/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-9, 17 and 18, drawn to a printed circuit board, classified in class 174, subclass 252.
 - II. Claims 10-16, drawn to a method of manufacturing a printed circuit board, classified in class 29, subclass 832+.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions group II and I are related as process of making and product made.

The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process. The product does not need the steps or force fitting or press fitting the heat conducting member.

3. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

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4. Because these inventions are independent or distinct for the reasons given above and the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

5. During a telephone conversation with Paul D. Greenley (Reg. 31,019) on March 2, 2006 a provisional election was made without traverse to prosecute the invention of group I, claims 1-9, 17 and 18. Affirmation of this election must be made by applicant in replying to this Office action. Claims 10-16 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Priority

6. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been received placed of record in the file.

Claim Objections

7. Claim 7, 17 and 18 are objected to because of the following informalities:

Regarding claim 7, "a top side of the HCM is **plainly** aligned with the upper side of PCB" is unclear. It is considered that topside of both the HCM and PCB are on the same plane. Appropriate correction is required.

Regarding claim 17, the claim language is unclear. The claim is directed to a heat-conducting member, for a printed circuit board, however PCB is also recited in the

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body of the claim. Further, it is depending upon claim 1, which is printed circuit board.

Claim language to be changed to clearly claim the invention. Claim 18 depend upon claim 17 and inherit the same deficiency.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-3, 7 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Martin Stadlmeier, Patent Document No. De 199 16 010 C.

Regarding claim 1, Admitted prior art of Stadlmeier discloses a printed circuit board--PCB--having a through-hole between an upper side and a lower side of the PCB, comprising: at least one electronic component (2) attached to the upper side, at least one heat-conducting member--HCM—(1) for inserting into the through-hole (6), extending from the upper side to the lower side, and being thermally coupled with the component, the HCM comprising a substantially planar top portion (see figure 4) and a tapered bottom portion (see figure 4).

Regarding claim 2, Stadlmeier further discloses the through-hole is arranged substantially centrally underneath the component (2), topside of the HCM is directly thermally coupled with a bottom side of the component (see figure 3).

Regarding claim 3, Stadlmeier further discloses the HCM comprises a disc-shaped top portion and a ring-shaped bottom portion extending from the top portion, the top portion is thermally coupled with the component (see figure 4).

Regarding claim 7, the modified structure of Stadlmeier further discloses topside of the HCM is plainly aligned with the upper side of the PCB (see figure 3).

Regarding claim 8, the modified structure of Stadlmeier further discloses the HCM has a substantially rotationally symmetrical shape (see figure 3).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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11. Claims 4-6, 9, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stadlmeier as applied to claim 3 above, and further in view of Azar (US Patent No. 5,920,458).

Regarding claim 4, Stadlmeier discloses all the features of the claimed invention as applied to claim 3 above, but does not disclose the top portion comprises several projections radially extending from an outer edge of the top portion, the projections affix the HCM to the PCB by penetrating into an inner wall enclosing the through-hole.

Azar discloses a heat conducting member (post 28) and further recites that the post can have any desired shape that can be readily fit into the aperture of the circuit board and further recites the it can have at both ends or knurling to facilitate better press fitting avoiding crack to the board. Azar further recites a heat sink with cooling device attached to the lower side of the board (figure 5).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the structure of Stadlmeier with several projections (knurling) radially extending from an outer edge of the top portion, from the teachings of Azar, in order to facilitate better press fitting of the heat conducting member avoiding crack to the board.

Regarding claim 5, the modified structure of Stadlmeier further discloses between the bottom portion and an inner wall enclosing the through-hole a ring shaped gap is provided (see figure 4).

Regarding claim 6, the modified structure of Stadlmeier further discloses the bottom portion has a final shape resulting from plastically deforming an origin shape of the bottom portion (see figure 4).

Regarding claim 9, the modified structure of Stadlmeier further discloses the HCM is thermally contacted with at least one of a heat sink and a cooling device preferably attached to the lower side of the PCB (as applied to claim 4 above).

Regarding claim 17, the modified structure of Stadlmeier further discloses the HCM has an origin shape before and a plastically deformed final shape after it is inserted into the through-hole of the PCB, the HCM has a disc-shaped top portion and a ring-shaped bottom portion extending from the top portion (see figure 3).

Regarding claim 18, the modified structure of Stadlmeier further discloses the top portion comprises several projections radially extending from an outer edge of the top portion (as applied to claim 4 above); in the origin shape, the bottom portion has a truncated conical profile tapering with increasing distance from the top portion (see figure 4); the HCM has a substantially rotationally symmetrical shape; the HCM is made as a one-piece element (see figure 4).

12. Claims 1-2 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Azar (US Patent No. 5,920,458) in view of Schneider (US Patent No. 5,173,301).

Regarding claim 1, Azar, in figure 6, discloses a printed circuit board--PCB-- having a through-hole between an upper side and a lower side of the PCB, comprising: at least one electronic component (14) attached to the upper side, at least one heat-conducting member--HCM--(28) for inserting into the through-hole (24), extending from the upper side to the lower side, and being thermally coupled with the component, the HCM comprising a substantially planar top portion (see figure). Azar does not disclose the HCM having a tapered bottom portion.

Schneider, in figure 4, discloses a heat-conducting member with tapered section and further recites that the tapered member will facilitate better interference fit without damage to the board (column 3, line 54 to column 4, line 8).

A person of ordinary skill in the art at the time of applicant's invention would have been motivated to provide the a tapered heat conducting member to facilitate better interference fit without damage to the board.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the structure of Azar with the heat conducting having a tapered bottom portion, as taught by Schneider, in order to facilitate better interference fit without damage to the board.

Regarding claim 2, the modified structure of Azar further discloses the through-hole is arranged substantially centrally underneath the component, topside of the HCM is directly thermally coupled with a bottom side of the component (see figure 6).

Regarding claim 7, the modified structure of Azar further discloses a top side of the HCM is plainly aligned with the upper side of the PCB (see figure 6).

Regarding claim 8, the modified structure of Azar further discloses the HCM has a substantially rotationally symmetrical shape (circular shape, shown in detail in figure 1).

Regarding claim 9, the modified structure of Azar further discloses the HCM is thermally contacted with at least one of a heat sink and a cooling device preferably attached to the lower side of the PCB (see figure 6 and 5).

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Pastore (US Patent No. 5,285,352), in figure 1 discloses a structure with a heat-conducting member 28 directly below the electronic component (12) with top surface of the heat-conducting member planar with the top surface of the board.

Kang (US Patent No. 6,000,125), in figure 1, disclose a heat-conducting member (24) below the microprocessor (12).

Chao (US Patent No. 5,095,404), in figure 3, discloses an assembly with heat conducting member (heat spreader 23) and heat pipe (25).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (571) 272 1933. The examiner can normally be reached on M-F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272 1957. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ishwar (I. B.) Patel
Patent Examiner
Art Unit: 2841
March 5, 2006